

REMARKS

A. OFFICE ACTION INCONSISTENCIES

Before addressing particular rejections of claims made in the Office Action mailed on October 10, 2008, several issues regarding the Office Action are raised and require clarification. These issues are identified as follows:

A.1 THE CITED “APRIL 13, 2004 FILING” IS UNCLEAR

The cover sheet of the Office Action indicates it is responsive to the filing made on April 13, 2004. It is not clear what this refers to. It does not appear that the file reflects any filing on this date. Clarification is required.

A.2 STATUS OF MAY 2, 2006 PRELIMINARY AMENDMENT IS UNCLEAR, INCLUDING EXAMINATION OF CLAIMS 34-41

A preliminary amendment was filed on May 2, 2006. It appears that this preliminary amendment has not been considered or entered. Among other changes to the application, the preliminary amendment introduced new claims 34-41. It appears that these claims have not been examined. They are not addressed on the Office Action cover sheet or in the Detailed Action. Clarification on the status of the preliminary amendment and claims 34-41 is required.

A.3 THE STATUS OF CLAIMS 3-6, 16, AND 31 IS UNCLEAR

The Office Action cover sheet indicates that claims 1-34 are rejected. In the Detailed Action, however, claims 3-5 are rejected only under a §112 rejection, claims 5 and 31 have not been rejected, allowed, or otherwise commented on.

Claims 3-5 have been rejected under §112 as indefinite based on the recitation of “M.” This rejection is believed to be improper, however, based on the

preliminary amendment which amended “M” to be “metal.” Further, it is submitted that this rejection is more properly posed as an objection since it is directed to a typographical error. Amendment of the claims are not believed to affect their scope

The rejection of claim 16 is not clear. Page 3 of the Detailed Action indicates that claims 1, 2, 7-15, 17-19, 21-26, 27-30 & 32-34 are rejected. Claim 16 is not addressed in the introduction to this rejection, but the final paragraph on page 3 states “with respect to claims 1 & 16, 100% formic acid may be used ..” Thus it appears that claim 16 was intended to be rejected under this rejection. Claim 16, however, recites Pd and Au supported on carbon – not a 100% formic acid fuel.

Clarification is required regarding the status and rejections of these claims.

A.4 THE REJECTION OF CLAIMS 17-29 AND 32 IS UNCLEAR

Pages 5 and 6 of the Office Action state that “with respect to claims 17-29, 21 & 32, it would have been obvious ... to employ the formic acid concentration of 25% to 65% ...”. Initially, it is noted that claim 21 is included in the range of claims 17-29, so it is not clear if claim 21 is a typographical error in this phrase. Secondly, many of these claims do not recite a formic acid concentration of 25% to 65%. Claim 18 (now canceled) recited at least 25%, claim 19 recites at least 40%, claim 21 at least about 25% and claim 32 (now canceled) at least about 25%. None recite a concentration of 65%, however, and remaining claims subject to this rejection did not previously recite any formic acid concentration at all (although many have been amended to). Clarification is required.

The above inconsistencies of Office Action make responding to some of the present rejections in a meaningful manner difficult. The claims have been amended, however, and remarks are provided below to traverse the rejections as they are best understood in order to avoid further delay in prosecution of the application.

B. THE OBVIOUSNESS REJECTIONS OF CLAIMS 1-34 OVER HAMPDEN-SMITH ARE IMPROPER

Independent claim 1 has been amended to recite elements of former claim 18, including a formic acid fuel concentration of at least about 25%. Independent claim 21 also recites a formic acid fuel concentration of at least about 25%. Independent claim 22 has been amended to recite elements of former claim 32 including a formic acid fuel solution having a concentration of at least about 25%. Each of claims 18, 21 and 32 stand rejected as obvious over Hampden-Smith. It is submitted that the obviousness rejections of these claims is improper for multiple reasons and must be withdrawn.

B.(1) HAMPDEN-SMITH FAILS TO ENABLE ANY PARTICULAR FORMIC ACID FUEL CONCENTRATION

The Office Action cites Hampden-Smith as disclosing a formic acid fuel of 100% concentration. It is submitted that this is incorrect. Although Hampden-Smith makes a cursory comment in the background section that formic acid is a possible fuel, the reference fails to teach any particular concentration. Para. 006. The invention of Hampden-Smith is directed to methanol and hydrogen cells only – other than the cursory comment in the background section no further teaching of formic acid is provided. See, Abstract. Hampden-Smith fails to provide any suggestion or motivation to direct one considering its methanol / hydrogen cell teachings to formic acid, much less the recited concentration. Accordingly, the claimed formic acid concentration of at least about 25% is not enabled.

Alleging that Hampden-Smith discloses the claimed formic acid concentration represents a conclusory interpretation of the reference, and the rejection is therefore improper: “(R)ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational

underpinning to support the legal conclusion of obviousness.” In re Kahn, 441 F.3d 977, 988, (Fed. Cir. 2006).

B.(2) THE OBVIOUSNESS REJECTIONS OF CLAIMS 1-33 OVER HAMPDEN-SMITH DO NOT ESTABLISH A PRIMA FACIE CASE OF OBVIOUSNESS

The MPEP states that a prima facie case of obviousness requires, among other things, objective evidence which establishes (under a preponderance of the evidence standard) a teaching to modify the prior art reference components to construct a device substantially equivalent to that claimed. This generally encompasses two sub-steps: (1) identifying objective evidence teaching how to modify the prior art components; and (2) identifying objective evidence teaching how to combine the modified individual components. MPEP §§2141, 2143.

The Examiner must set forth a rationale, supported by objective evidence (under a preponderance of the evidence standard) that the prior art at the time of invention provided a teaching to modify the prior art reference components to achieve the claim at issue. *Id.* The preferable evidence is an express teaching to modify/combine within the properly defined sources of prior art. In the absence of such express teaching, an Examiner may attempt to establish a rationale to support a finding of such teaching based upon, express teachings taken from the prior art. MPEP § 2144; *In re Dembiczak*, 50 U.S.P.Q. 2d 1614 (Fed. Cir. 1999).

This has been referred to as the “teaching/suggestion/motivation test” (TSM). Although a rigid application of TSM was rejected in *KSR Int’l. Co. v. Teleflex, Inc.*, 82 USPQ2d 1385 (2007), the test was not discarded. The Court simply required consideration of the general knowledge of those skilled in the art and other factors, using a common sense approach, but also warned against overly broad findings of obviousness:

... a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. ... (I)t can be important to identify a reason that would have

prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what ... is already known.

Id., at 1741. The MPEP also warns against overly broad findings of obviousness based on the impermissible use of hindsight, and sets forth at least two rules that ensure against such rejections. The first is that it is impermissible to use hindsight gained from considering the application:

... the Examiner must step backward in time and into the shoes worn by the hypothetical “person of ordinary skill in the art” when the invention was ... (made) ... Knowledge of an Applicant’s disclosure must be put aside in reaching this determination, ... The tendency to resort to “hindsight” based upon an Applicant’s disclosure is often difficult to avoid due to the very nature of the examination process.

MPEP §2142. Thus, if the only objective evidence of such teaching to modify and/or combine is found in applicant’s disclosure, no evidence of such teaching exists.

The second rule requires that an alleged advantage or beneficial result that would have been produced by a modification and/or combination of the prior art reference components must be found in objectively verifiable teachings of the prior art. MPEP §2144. Thus, to avoid the use of impermissible hindsight, these MPEP rules make clear that absent objective evidence (sufficient to satisfy the preponderance of the evidence standard), no teaching of such modification and/or combination exists.

In consideration of the above, it is submitted that the obviousness rejections of independent claims 1 (formerly claim 18), 21 and 22 (formerly 32) are improper. The required elements of these claims, including a formic acid fuel solution of at least about 25%, achieves unexpected advantages over the prior art and there has been no objective evidence put forth suggesting that one considering Hampden-Smith would have any expectation of achieving these or would be led to trying the claimed combination of a

particular concentration of formic acid fuel solution. It is further submitted that the obviousness rejection of these claims over Hampden-Smith can only be made through the impermissible use of hindsight gained after considering the present application.

B.(3) PRIOR TO THE PRESENT INVENTION HIGH FORMIC ACID CONCENTRATIONS WERE NOT KNOWN

Further evidence of the novelty, non-obviousness, and the impropriety of citing Hampden-Smith in an obviousness rejection is the fact that prior to the present invention high formic acid fuel cell concentrations were not known. It is submitted that no prior art reference has been cited disclosing a formic acid fuel cell having a formic acid concentration near the claimed 25% of independent claims 1, 21 and 22. If such concentrations were obvious in light of Hampden-Smith as is suggested by the Office Action, it is submitted that some prior art reference would be identified teaching this concentration. No prima-facie case of obviousness can be made based on the failure to cite such a reference.

B.(4) HAMPDEN-SMITH IS DIRECTED TO HYDROGEN AND METHANOL FUEL CELLS, NOT FORMIC ACID CELLS

Other than a single cursory comment regarding an unknown concentration of formic acid fuel in the background section, the teaching of Hampden-Smith is directed to methanol fuel cells or hydrogen fuel cells. "According to the present invention, a method is provided for manufacturing MEA's which are useful in PEMFC (hydrogen fuel cells) and particularly in DMFC (direct methanol fuel cells)." Para 75.

Even accepting for the sake of argument only that one considering Hampden-Smith's methanol fuel cell teaching would consider substituting formic acid, it is submitted that only low concentrations would be attempted. Hampden-Smith recognizes the well-known problem of methanol fuel cross-over: "Cross-over, as known

by those skilled in the art, is when the fuel, e.g. methanol, is transported from the anode, through the electrolyte and into the cathode. Methanol cross-over is undesirable for several reasons. ... All these factors contribute to a decrease in fuel cell performance and operating lifetime.” Para. 88. It is well known that methanol cross-over generally increases with increasing concentration, and for this and other reasons that methanol fuel cells typically operate with low methanol concentrations. This is yet another reason one knowledgeable in the art considering Hampden-Smith would not be led to the claimed formic acid concentrations (i.e., at least about 25% in claims 1 and 21).

C. CLAIMS 2-16, 19-20, 23-31, 33-34 ARE ALLOWABLE

Claims 2-16 and 19-20 depend from claim 1 and are allowable for the same reasons as are that claim. Claims 23-31 and 33-34 depend from claim 22 and are allowable for the same reasons as are that claim. Various of these claims are allowable for other reasons as well.

Claims 2-16 and 25-31 recite particular catalyst configurations that have been discovered to be of particular utility when used with formic acid fuel cells. Hampden-Smith has been cited as disclosing these elements. The portions of Hampden-Smith cited as disclosing these elements, however, teach such elements for use with methanol fuel cells, not with a formic acid fuel cell as is claimed. It is well-known in the technology involved that formic acid and methanol are different chemical compounds and would be expected to behave differently with various catalyst configurations. It is submitted that catalyst configurations taught by Hampden-Smith for use with methanol fuel solutions would not be obvious to one practicing a formic acid fuel cell having the claimed concentration.

Claims 3, 16, 26 and 31 recite an anode catalyst comprising Pd and Au, and claim 16 wherein the combination is supported on carbon. No reference has been cited as disclosing these required elements. Clarification is required.

Claim 19 depends from claim 1 and further recites that the formic acid concentration is at least about 40%. As discussed above, no reference has been cited that discloses or suggests this recited element.

D. CLAIMS 33-34 ARE ALLOWABLE – NO ELECTRICALLY CONDUCTIVE MATERIAL OVERLYING THE CATALYST IS DISCLOSED, SUGGESTED OR EVEN ALLEGED

Claims 33-34 depend from claim 32 and further recite an “electrically conductive material overlying said anode catalyst.” Claim 34 depends from claim 33 and further recites that the electrically conductive material comprises a metal mesh. No reference has been cited as disclosing or suggesting these recited elements. No prima-facie case of obviousness has therefore been presented, and these claims are therefore allowable. Should the rejection of these claims not be withdrawn, clarification is required.

E. CLAIMS 35-42 ARE ALLOWABLE

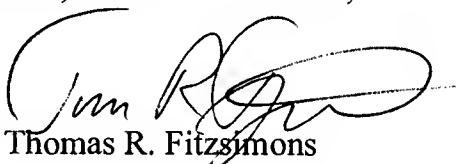
Claims 35-41 were previously presented but have apparently not been examined. These claims are believed to be allowable. New claim 42 has been presented, depends from claim 23, and recites a formic acid fuel concentration of at least about 40%.

F. CONCLUSION

Applicant requires clarification of numerous errors and inconsistencies in the Office Action. Applicant further respectfully submit that the claims in their current form are allowable. If a Petition under 37 C.F.R. §1.136(a) for an extension of time for response is required to make the attached response timely, it is hereby petitioned under 37 C.F.R. §1.136(a) for an extension of time for response in the above-identified application for the period required to make the attached response timely. The Commissioner is hereby authorized to charge fees which may be required to this application under 37 C.F.R. §§1.16-1.17, or credit any overpayment, to Deposit Account No. 07-2069.

Respectfully submitted,

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